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OXC-0675-60

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27 June 1960

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MEMORANDUM FOR : The Record

SUBJECT : Trip Report - Lockheed Aircraft, Burbank, California, 14 through 16 June 1960

REFERENCE : (a) [redacted] memo, OXC-0594-60, dtd. 26 May 1960
(b) [redacted] memo, OXC-0520-60, dtd. 28 April 196

1. Subject facilities were visited by the writer for the purpose of reviewing certain aircraft propulsion system considerations and for a brief orientation visit [redacted] 25X1

25X1 2. [redacted] was visited on 15 June. On 14 and 16 June, propulsion system considerations were discussed as summarized below:

(a) Ejector:

Mr. C. L. Johnson indicated that due to an extraordinarily high rate of material rejection, the first completed ejector which was to be delivered to Pratt & Whitney for endurance testing in August will now be delivered in October.

(b) Inlet:

Wind tunnel tests are in process in order to solve two problems remaining in what appears to be a well designed inlet.

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The first problem constitutes a high boundary layer bleed flow which results in excessive drag. It is hoped that this condition will be alleviated by finding a more optimum inlet area to throat area ratio for mission flight regime.

The second problem constitutes a poor pressure recovery for the bleed supplying engine nacelle cooling and ejector secondary air which results in a secondary air pressure deficiency and a consequent reduction in gross thrust. It is hoped that this condition will be corrected by a combination of the optimized contraction ratio described above and by obtaining ejector secondary air more directly from the inlet rather than through the pressure limiting bleed.

Further detailed discussion of the inlet and inlet control system was precluded by the absence of [redacted] (Propulsion 25X1
Performance) who was conducting the tunnel tests cited above.

(c) <u>Heat Rejection</u>:

As a result of airframe/engine contractor negotiation, airframe to engine fuel delivery temperatures were recalculated and found to be 280°F instead of the maximum allowable of 300°F. This 20°F margin now permits engine component cooling A/B fuel to be recirculated directly to the engine main fuel system rather than returned to the tank. This alleviates the immediate problem as described in reference (a), para 6.

(d) <u>Engine/Airframe Schedule</u>: 25X1

Considerable time was spent by [redacted] (Chief-Flight Test) and the writer in roughing out anticipated airplane/engine utilization schedules. This study, based upon present initial flight schedule and several assumptions, indicated incompatibility between the airplane initial flight schedule and the engine delivery schedule. In addition to registering disagreement with certain of the assumptions, Mr. C. L. Johnson expressed the feeling that some incompatibility with engine deliveries must be forborne and that the present engine delivery schedule is satisfactory.

It is the writer's opinion that any change to the engine delivery schedule at this time would be unwise in view of possible airframe schedule slippage as reflected by the reported ejector status; however, upon incorporation of the assumption changes suggested by Mr. Johnson, a review of airframe/engine schedule compatibility will be released.

(e) Fuel:

Discussion regarding the possible use of a high energy per gallon fuel such as RJ-1 for inflight refueling as described in reference (a) para 4C revealed that although an increase in range could be realized, a tradeoff in mission altitude resulting from weight increase would be necessary. Although the exact magnitude of the altitude sacrifice was not determined, it is felt that any decrease in mission altitude is unacceptable and therefore the cost of developing RJ-1 thermal stability to that of PWA-523 is highly questionable.

(f) Aircraft Fuel System:

Fuel management, refueling, fuel transfer, fuel dumping, engine feed, and recirculation were discussed as part of an orientation presentation made by [redacted]

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Full scale system mockup calibration tests involving the above operating phases are currently underway with favorable results so far.

(g) Exhaust Gas Ionization System Allowable Weight:

Current airplane bogey weight for subject system is set at 200 lbs. Current estimated weight of the additive, carrier, and control systems for two engines (supply tank excluded) is approximately 300 lbs. This latter figure is subject to change pending full scale and small flame test results.

(h) Engine Lubricant:

Reserved acceptance was expressed for the 40°F pour point of PWA-524 lube oil which necessitates preheating or dilution for lower temperature operation as described in reference (b), para 1C.

(i) Air Conditioning and Pressurization:

Subject system was reviewed briefly as a matter of orientation.

(j) Fire Detection:

Each engine nacelle will be provided with a conventional zoned system for engine overheat and/or fire detection. Indicator lights will be located in the cockpit on the engine panel. Proper element triggering temperatures will be established during flight test.

(k) Engine Starting:

Portable ground starter units powered by Chevrolet Corvette 350 H.P. engines are being designed and built by [redacted] Starting will be accomplished through a direct flexible mechanical coupling between the ground unit and the engine gearbox starter pad. 25X1

(l) Preliminary Flight Rating Tests:

The engine P.F.R.T. is considered realistic and entirely acceptable by the airframe contractor as expressed by [redacted] (Powerplant Installation). 25X1

(m) Coordination:

Mr. C. L. Johnson indicated that airframe/engine contractor coordination continues to be excellent. 25X1

3. Due to the absence of [redacted] the following items were not discussed:

(a) Installed Engine Performance

(b) Environmental Weather Effect on Installed Engine Performance

(c) Thrust Decay Rate

(d) Inlet Control System

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[redacted]
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27 June 1960
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